

CASE REPORT

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## Double perforators-based superior gluteal artery propeller flap for reconstruction of lumbar defects

Obi Onyekwelu and Damir Kosutic

Department of Plastic Surgery, The Christie NHS Foundation Trust, Manchester, UK

### ABSTRACT

Wide local excision of skin cancer in the lumbar area is a challenge to reconstruct. We report on the successful use of a two perforators-based superior gluteal artery perforator propeller flap, for the reconstruction of a lumbar defect.

### ARTICLE HISTORY

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### KEYWORDS

Perforators-based; superior gluteal artery propeller flap; lumbar defects

## Introduction

We report on the successful use of a two perforators-based superior gluteal artery perforator (SGAP) propeller flap, for the reconstruction of a lumbar defect after excision of intermediate thickness melanoma. Unlike the standard SGAP propeller flap where reconstruction is achieved by flap rotation around a single dominant pedicle,[1] we based our flap on two SGAPs located relatively distant from each other. Hence, the pivot point for flap rotation was located midway between both perforators.

## Methods

A 41-year-old male patient presented for wide local excision of biopsy-proven intermediate thickness malignant melanoma in the lumbar area and sentinel lymph node biopsy. Preoperative planning included detection of a dominant superior gluteal artery skin perforator using a hand-held Doppler only, utilizing the free-style perforator flap concept.[2]

After 2-cm wider excision of the melanoma scar and sentinel lymph node biopsy, the patient had a considerable circular defect in the lumbar area, left of the midline (Figure 1). The SGAP propeller flap was planned in reverse using a template from the defect. Intra-operative Doppler was performed to evaluate for the location of the perforators. The pivot point was

determined to be midway between both perforators. During the design, the tip of the flap extended to the posterior superior iliac spine in order to achieve enough mobility to resurface the defect.

An exploratory incision through the skin, subcutaneous tissue and gluteus maximus fascia was extended from the defect to the area over the posterior superior iliac spine. The flap was raised subfascially. Careful dissection under 3.5\* loupe magnification was performed revealing two dominant perforators emerging between the gluteus maximus muscle fibres (Figure 2(a)). They were located 6 cm away from each other and emerged from parallel rows (Figure 2(b)). The superior border of the flap was incised through the fascia and the flap was carefully dissected in the lateral-to-medial direction. Both perforators were freed from the connective tissue and dissected intramuscularly to obtain desired mobility and arc of rotation.

The flap was inset, achieving harmonious integration without tension. The donor site was closed directly with the flap decompressing its medial aspect. Transparent adhesive film dressings were applied and the patient was nursed in the lateral position. Post-operative care included intravenous fluid resuscitation until he was eating and drinking freely upon return to the ward. We used a combination of pre-emptive analgesia consisting of intravenous opiates administered by the Anaesthetist and local anaesthesia at the surgical site administered by the Senior Author, as well as

**CONTACT** Damir Kosutic  [dkosutic@hotmail.com](mailto:dkosutic@hotmail.com)  Consultant Plastic and Reconstructive Surgeon, Department of Plastic Surgery, The Christie NHS Foundation Trust, 550 Wilmslow Road, Manchester M20 4BX, UK

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**Figure 1.** A 41-year-old male with lumbar defect.

regular and as-required post-operative oral analgesia consisting of non-steroidal anti-inflammatories and opiates, respectively.

## Results

Intra-operative Doppler demonstrated satisfactory flow from the superior gluteal artery perforating vessels in the flap. Even though we initially planned to perform a V-Y perforator local advancement, intra-operative findings revealed too much tension at the lateral border of the flap. In order to achieve tension-free reconstruction without further dissection of perforators proximally towards the main pedicle, we decided to perform a “propeller flap”, which intra-operatively provided easier closure without any tension. When the flap was completely freed up from its undersurface, it was rotated some 170° clockwise to reach the uppermost part of the defect in a “propeller fashion” (Figure 2(c)).

Since the two dominant perforators were 6 cm apart, the pivot point was determined midway between both. Inclusion of more than one perforator in the flap design has proven to ensure better blood supply,[2] particularly with improvement of venous outflow. There were no signs of venous stasis or arterial compromise of the flap’s circulation. The patient was discharged having mobilized independently on

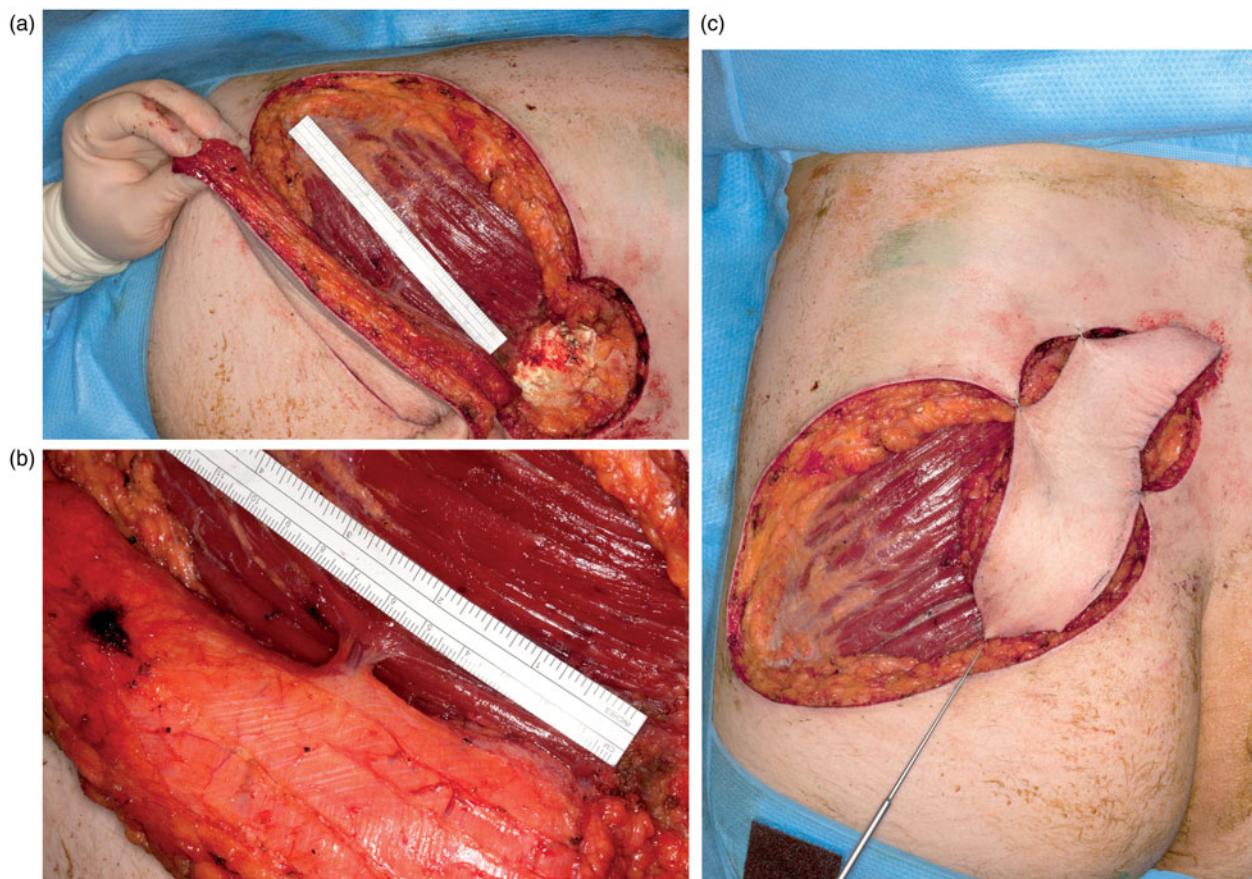
day 1 post-operatively. Follow-up clinical examination demonstrated an acceptable functional and aesthetic outcome (Figure 3). The patient was satisfied with the result without any complications.

## Discussion

The “free-style perforator flap”-concept is particularly applicable for areas with variable vascular anatomy of the skin vessels, such as in the gluteal area where SGAPs are abundant, though their location is inconsistent.[3] Ahmadzadeh et al. [4] have demonstrated in their cadaveric study that each perforator of the superior gluteal artery supplies an area of  $21 \pm 8 \text{ cm}^2$ , on average finding  $5 \pm 2$  perforators of the superior gluteal artery. The gluteal region provides soft tissue with adequate qualities such as colour-match, texture and pliability, which make it an excellent choice for lumbar area reconstruction. The propeller gluteal artery perforator flap has minimal morbidity and preserves the superior and inferior gluteal vessels; the distal end of the flap can reach beyond the midline. This makes it a very useful option for reconstruction after wide local excision of skin cancer in the lumbar area, as we demonstrate in this present case.

Having initially planned a V-Y perforator local advancement flap, we realized that the proximity of the perforators to the defect would preclude significant advancement. A local rotation flap would be an appropriate option to consider. However, the drawbacks include unpredictable vascularity (i.e. random pattern). The Senior Author has previously described how propeller flaps can achieve tensionless reconstruction [5] and would be the ideal option.

It is unusual to incorporate the second perforator. The fact that we based our flap on two perforators that were distant to each other, and in distinct parallel rows, improved the flap’s blood supply. This particularly aided venous outflow without compromising the flap’s mobility as a result of the asymmetric and large flap design. Shifting the pivot point from the single perforator to a given point midway between the medial and lateral perforators reduced the torsion on a single perforator. This improved the venous outflow, which is a recognized drawback of standard perforator flaps.[6] Although some torsion of the perforators while using the “propeller” technique exists, it did not compromise the viability of the flap. In order to overcome the drawbacks of incorporating both perforators, we had designed a large skin island which also served to resurface the defect. Propelling such a flap with a large distance between perforators is possible only in this anatomical area, where the subcutaneous tissues are



**Figure 2.** (a) Technique for coverage of lumbar defect using the double perforators-based superior gluteal artery perforator flap. The flap is raised as described in the text and the two dominant perforators are demonstrated emerging between the gluteus maximus muscle fibres. (b) The two dominant perforators are located 6 cm away from each other emerging from parallel rows. (c) The flap is completely freed from its under surface and rotated some 170° clockwise to reach the uppermost part of the defect in a "propeller fashion".



**Figure 3.** The 41-year-old male 6-week post-double perforators-based superior gluteal artery perforator flap reconstruction.

well represented in our subject population. The donor site can be closed primarily with the flap decompressing the primary closure, leaving an acceptable scar that does not interfere with sitting.

## Conclusion

We believe that the superior gluteal artery propeller flap based on two perforators provides a valuable reconstruction option with improved blood supply. The recruitment of two perforators in the flap mitigates against the risk of venous congestion, thereby decreasing the frequency of tip necrosis. This provides a valuable option for treating challenging defects of the lumbar area facilitating early mobilization.

## Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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